REMARKS

Reconsideration of this Application is respectfully requested. Applicants have addressed every objection and ground for rejection stated in the Office Action mailed June 24, 2003, Paper No. 26, and believe the Application is now in condition for allowance.

1. Statement of the Case and Status of the Claims.

The present invention provides a novel electrode active material, as well as electrodes and batteries containing the same. The material has the nominal formula $LiFe_{1-y}Mg_yPO_4$, wherein $0 < y < 1$.

Claims 135 - 178 are currently pending in the present Application. Upon entry of the present Amendment, Claims 135 - 178 will be cancelled, and new Claims 179 - 227 will be pending. Care has been taken to ensure that the new Claims contain no new matter.

Currently, Claims 135 - 152 stand rejected under 5 U.S.C. §102(b) as being anticipated by Ni et al., "Triphylite-lithiophilite Series in China" Inst. Miner. Deposits; Chin. Acad. Geol. Sci.; Peop. Rep. China; Yanshi Kuangwuxue Zazhi (1989); vol. 8(2); pp. 144-155 ("Ni article"). Claims 135 - 147, 152 - 161, 165- 172, and 176 stand rejected under 35 U.S.C. §103(a) as being obvious in view of U.S. Patent No. 6,514,640 to Armand et al. ("Armand '640").

The Examiner stated in the Office Action that the subject matter of Claims 162 - 164, and 173 - 175 would be allowable if rewritten in independent form, including all of the limitations of the base claim and any intervening claims. The Examiner noted that the prior art of record fails to suggest electrodes and batteries comprising compounds with an olivine structure and the empirical formula $LiFe_{1-y}Ca_yPO_4$, wherein $0 < y \leq 0.2$. Applicants thank the Examiner for her consideration of these Claims, and for deeming the subject matter thereof allowable over the prior art of record. Applicants will refrain from amending the present Application in accordance with the Examiner's suggestion, at this time, in order to provide Applicants the opportunity to pursue .

2. Information Disclosure Statements

Applicants submitted copies of two Information Disclosure Statements on July 18, 2003, which were previously submitted by Applicants, through Applicants' counsel, on September 7, 2001 and June October 11, 2001. These Information Disclosure Statements were provided because it is not clear from the record, at this time, whether these Information Disclosure Statements were formally entered. Applicants respectfully request that these Information Disclosure Statements be considered and made of record in the present Application.

3. Amendment to Specification

Applicants have amended the Specification to correct a typographical error. In particular, pg. 48, line 10 has been amended to change the reported first-cycle charge capacity for Applicants' working example for the $LiFe_{0.8}Mg_{0.2}PO_4$ cathode material, from 140 mA•hr/gr to 135 mA•hr/gr.

Applicants submit that the amendment is supported by the specification as filed. In particular, the specification as filed reported that the first-cycle charge capacity for the $LiFe_{0.8}Mg_{0.2}PO_4$ cathode material "corresponds to $LiFe_{0.8}Mg_{0.2}PO_4$ where x appears to be equal to about 0.79". The $LiFe_{0.8}Mg_{0.2}PO_4$ cathode material has a theoretical charge capacity of 136.8 mA•hr/gr (80% of the theoretical capacity for $LiFePO_4$, which is 171 mA•hr/gr). Accordingly, extraction of 0.79 Li (of the available 0.8 Li) corresponds to a first-cycle charge capacity of 135 mA•hr/gr.

4. Ni Article

Claims 135 - 152 stand rejected under 35 U.S.C. §102(b) as being anticipated by Ni et al., "Triphylite-lithiophilite Series in China" Inst. Miner. Deposits; Chin. Acad. Geol. Sci.; Peop. Rep. China; Yanshi Kuangwuxue Zazhi (1989); vol. 8(2); pp. 144-155 ("Ni article"). Applicants have enclosed with this Amendment a full translation of the Ni article, attached as Exhibit 1.

The Examiner has asserted that the Ni article discloses compounds of the form $LiFe_{1-y}M_yPO_4$, where M is Mg or Ca. The Examiner acknowledges that the Ni article describes minerals having the chemical composition of triphylite-lithiophilite, wherein besides the major constituents Fe^{2+} **and** Mn^{2+}, the cations at the octahedral M(2) sites in the mineral contains Mg^{2+},

Ca^{2+} and/or Fe^{3+}. The Ni article does not teach or suggest use of the compounds disclosed therein, in a secondary electrochemical cell.

In contrast, Applicants' claim an electrode active material represented by the nominal formula:

$$LiFe_{1-y}Mg_yPO_4,$$

Wherein $0 < y < 1$. Applicants' claimed compound does not contain Fe^{2+} **<u>and</u>** Mn^{2+}. Rather, Applicants claim, among other things, a compound containing Fe^{2+} in combination with Mg.

Furthermore, the Ni article fails to teach or suggest use of the compounds disclosed therein, in an electrode or a secondary electrochemical cell. Therefore, because the Ni article fails to teach or suggest the invention as claimed in new Claims 179 - 227, Applicants respectfully submit that new Claims 179 - 227 are patentably distinct from the Ni article.

5. <u>U.S. Patent No. 6,514,640 to Armand et al.</u>

Claims 135 - 147, 152 - 161, 165- 172, and 176 stand rejected under 35 U.S.C. §103(a) as being obvious in view of U.S. Patent No. 6,514,640 to Armand et al. ("Armand '640").

The Armand '640 patent discloses three classes of transition-metal compounds for use as electrode material in alkali-ion rechargeable batteries: the ordered olivine, the modified olivine and the rhombohedral NASICON structures.

The class or genus of "*ordered*" olivine compounds are defined by the general formula $LiMPO_4$, wherein M is a first row transition metal (e.g. $LiFePO_4$) or a combination of first row transition metals (e.g. $LiFe_{1-x}Ti_xPO_4$). (<u>See</u>, Col. 2, ll. 14-42). Neither the class of these "ordered" olivive materials, nor the class of NASICON materials embrace the claimed invention under any interpretation.

That leaves as potentially relevant to the claimed invention only the class of "*modified*" olivine compounds. Armand '640 discloses an extremely large class or genus of "*modified*" olivine compounds defined by the general formula:

$$Li_{x+y}M_{1-(y+d+t+q+r)}D_dT_tQ_qR_r(PO_4)_{1-(p+s+v)}(SO_4)_p(SiO_4)_s(VO_4)_v, \qquad (I)$$

wherein:

M may be Fe^{2+} or Mn^{2+} or mixtures thereof;

D may be a metal having a +2 oxidation state, preferably Mg^{2+}, Ni^{2+}, Co^{2+}, Zn^{2+}, Cu^{2+}, or Ti^{2+} ;

T may be a metal having a +3 oxidation state, preferably Al^{3+}, Ti^{3+}, Cr^{3+}, Fe^{3+}, Mn^{3+}, Ga^{3+}, Zn^{3+}, or V^{3+};

Q may be a metal having a +4 oxidation state, preferably Ti^{4+}; Ge^{4+}, Sn^{4+}, or V^{4+}; and

R may be a metal having a +5 oxidation state, preferably V^{5+}; Nb^{5+}, or Ta^{5+}.

Armand '640 also provides that M of general formula (I) may also be selected from the group consisting of Mn, Fe, Co, Ni and mixtures thereof. (See, Claim 1 of Armand '640; and Claim 26 of 08/998,264 as filed Dec. 24, 1997).

Armand '640 makes it clear that the "modified" olivine general formula (I) is subject to the following four "conditions," which causes the claimed $LiFe_{1-y}Mg_yPO_4$ species to be excluded from the scope of the general formula.

1. $0 \leq x \leq 1$;
2. $y + d + t + q + r \leq 1$;
3. $p + s + v \leq 1$; and
4. $3 + s - p = x - y + t + 2q + 3r$.

New Claims 179 - 186 of the present Application recite, among other things, a compound having the general nominal formula $LiFe_{1-y}Mg_yPO_4$, wherein $0 < y < 1$. Claims 187 - 200 recite, among other things, an electrode comprising the $LiFe_{1-y}Mg_yPO_4$ compound. Claims 201 - 227 recite, among other things, a battery comprising the $LiFe_{1-y}Mg_yPO_4$ compound.

The Examiner has asserted that "a lithium ion battery with a cathode active material of the formula $LiFe_{1-y}Mg_yPO_4$ would have been obvious to one with ordinary skill in the art based upon the Armand et al. disclosure."

In repeating this obviousness rejection based on the Armand '640 patent, the Office Action relies on a unique, though factually unsupported interpretation of Armand's disclosure, and also effectively ignores explicit teachings in the Armand patent that, as explained in applicant' prior Amendment, would have led a person skilled in the art away from the material embraced by the pending claims.

In chemical cases, to establish a *prima facie* case of obviousness under Section 103(a) for a claimed species in view of a single prior art reference, (1) a claimed species must fall within or be embraced by the genus taught in the reference, and (2) the reference must provide some motivation or suggestion to choose the claimed species from among the compounds defined by the genus.

Applicants submit that the claimed $LiFe_{1-y}Mg_yPO_4$ species is not *prima facie* obvious in view of the teachings of the Armand '640 patent. First, the claimed $LiFe_{1-y}Mg_yPO_4$ species is not *embraced* by the genus defined by the "modified" olivine general formula (I) as specifically described in the Armand '640 patent. Second, even if the claimed $LiFe_{1-y}Mg_yPO_4$ species were embraced by the broad general formula, the clear teachings of the Armand '640 patent do not *suggest* the claimed $LiFe_{1-y}Mg_yPO_4$ species to a person of ordinary skill in the art. Finally, the claimed $LiFe_{1-y}Mg_yPO_4$ species is not *prima facie* obvious in view of the teachings of the Armand '640 patent, because the claimed species exhibits superior properties over the modified olivine compound explicitly described in Armand '640.

A. Applicants' claimed $LiFe_{1-y}Mg_yPO_4$ species does not fall within the genus defined by the Armand '640 "modified" olivine general formula.

Applicants' claimed $LiFe_{1-y}Mg_yPO_4$ species is not obvious in view of the Armand '640 patent, because the claimed species does not fall within the genus of compounds as specifically defined by the Armand '640 "modified" olivine general formula (I).

As noted in detail in Applicants' Amendment filed April 2, 2003, Armand '640 states that the "modified" olivine general formula (I) is subject to the following four "conditions."

1. $0 \leq x \leq 1$;
2. $y + d + t + q + r \leq 1$;
3. $p + s + v \leq 1$; and
4. $3 + s - p = x - y + t + 2q + 3r$.

Application of the fourth "condition" ($3 + s - p = x - y + t + 2q + 3r$) to the "modified" olivine general formula (I) prevents one from deriving the claimed $LiFe_{1-y}Mg_yPO_4$ species. In order to arrive at Applicants' claimed $LiFe_{1-y}Mg_yPO_4$ species from the Armand '640 "modified" olivine general formula (I), one would have to pick and choose from among all the possible variables, the following values and substitute them into the "modified" olivine general formula (I).

1. $x + y = 1$;
2. $M = Fe^{2+}$;
3. $D = Mg^{2+}$ and $0 < d < 1$; and
4. t, q, r, p, s and $v = 0$.

To compare the substituents of Applicants' claimed $LiFe_{1-y}Mg_yPO_4$ species to the substituents of the Armand '640 "modified" olivine general formula (I), t, q, r, p, s and v must equal 0, and $x + y = 1$. It follows that if t, q, r, p, s and $v = 0$, then the fourth "condition" ($3 + s - p = x - y + t + 2q + 3r$) is simplified to:

$$\underline{3 = x - y.}$$

The Armand '640 first "condition" requires that $0 \leq x \leq 1$. Substituting the highest possible value for x into the simplified equation above yields $3 = 1 - y$. *Hence, it is clear that there are no possible values for either x or y which could be chosen to satisfy the simplified fourth "condition," namely $3 = x - y$, when, as claimed by Applicants, $x + y = 1$.* This is because x must be ≥ 3 in order to satisfy the simplified fourth "condition," yet the first "condition" requires that $0 \leq x \leq 1$. In other words, application of the four "conditions" to the "modified" olivine general formula (I) prevents one from deriving the claimed $LiFe_{1-y}Mg_yPO_4$ species. Therefore, the claimed $LiFe_{1-y}Mg_yPO_4$ species is not embraced by the genus defined by the Armand '640 "modified" olivine general formula (I).

A.I The Office Action Fails to Demonstrate the Fourth "Condition" Contains an Error

In an unusual attempt to avoid Applicants' clear showing that the claimed $LiFe_{1-y}Mg_yPO_4$ species is not embraced by the genus defined by the Armand '640 "modified" olivine general formula (I), the Office Action now asserts that "the [fourth] condition mentioned by Armand et al, is incorrect."

The Office Action reaches this conclusion on the sole basis that the condition ("equation") does not fit the "ordered" olivine formula. According to the Office Action "Obviously, the equation should be valid when reduced to the simplest, unsubstituted formula, $LiMPO_4$ (where M is Fe^{+2} or Mn^{+2})." Missing from the Office Action, however, is any explanation of why this asserted, but unsupported fact is obvious. That explanation is missing, we submit, because a skilled worker simply would not expect to apply a formula explicitly designed to describe the "modified" olivine material to the separate class of "ordered" olivine material. Thus, there is no valid reason to assume that a formula explicitly designed to describe the "modified" olivine material should also embrace the "ordered" olivine material. In the absence of that unsupported, and indeed unsupportable, assumption, the Office Action completely loses its foundation for concluding that the fourth condition can be ignored. It cannot be ignored.

In a similar vein, the Office Action also fails to explain specifically how "the electronic charge on the 'M' cation has [been] inadvertently omitted from equation" from the fourth "condition," or what the *correct* equation for the fourth "condition" should be. Furthermore, the Examiner has not stated what significance, if any, the *correct* fourth "condition" would have with respect to determining the patentability of the claimed $LiFe_{1-y}Mg_yPO_4$ species.

B. The teachings of the Armand '640 patent do not *suggest* the <u>claimed $LiFe_{1-y}Mg_yPO_4$ species.</u>

The teachings of the Armand '640 patent do not *suggest* the claimed $LiFe_{1-y}Mg_yPO_4$ species. The Armand '640 "modified" olivine general formula (I) describes an extremely large genus of compounds. The Armand '640 patent provides no express teachings which would motivate one to pick and choose the particular selections to arrive at the claimed $LiFe_{1-y}Mg_yPO_4$

species, from among all of the variables of the very large genus of compounds defined by the Armand '640 "modified" olivine general formula (I). One would have to pick and choose from among the numerous selections for each of M, D, T, Q and R (and ignore the four expressed conditions or alternatively, as the Examiner has suggests, "correct" the fourth condition) in order to arrive at the claimed $LiFe_{1-y}Mg_yPO_4$ species. Furthermore, one would have to pick and choose values for each of x, y, d, t, q, r, p, s and v in order to arrive at the claimed $LiFe_{1-y}Mg_yPO_4$ species. The Armand '640 patent fails to provide any particular reason why one should pick and choose the combination of Fe^{2+} for M and Mg^{2+} for D without any selection for T, Q and R. The Armand '640 patent fails to provide any particular reason why one should exclude all the other possibilities for M and D, all the possibilities for T, Q and R, and all possibilities for substitution of the PO_4^{3-} polyanion, to arrive at the claimed $LiFe_{1-y}Mg_yPO_4$ species. Therefore, the Armand '640 patent does not *suggest* the claimed $LiFe_{1-y}Mg_yPO_4$ species.

The Examiner has asserted that the claimed $LiFe_{1-y}Mg_yPO_4$ species is obvious in view of the Armand '640 patent because "Mg^{2+} is specifically mentioned as an isocharge substituent for Fe^{2+}." The Examiner has also states that Armand '640 teaches at Col. 14, ll. 3-7 that "either the anion sites, the cation sites, or both anion and cation sites may be substituted."

However, Applicants submit that these two teachings, even if improperly viewed in isolation, would not motivate one with ordinary skill in the art to pick and choose from among the numerous selections for each of M, D, T, Q and R in order to arrive at the claimed $LiFe_{1-y}Mg_yPO_4$ species. First, although "Mg^{2+} is specifically mentioned as an isocharge substituent for Fe^{2+}," the Examiner has failed to show how Armand '640 suggests picking only Fe^{2+} for M and Mg^{2+} for D without any selection for T, Q and R.

Furthermore, the Examiner has stated Armand '640 teaches "either the anion sites, the cation sites, or both anion and cation sites may be substituted." However, the Examiner has failed to reconcile this statement with the fact that, as discussed herein above, the fourth "condition" requires the presence of at least some amount of a trivalent element T^{3+}, a quadravalent element Q^{4+} and/or a pentavalent element R^{5+}, because t, q and/or r must be greater than 0 in order to satisfy the fourth "condition." Thus, Armand '640 actually encompasses single ion *aliovalent* substitutions of 'M', but not single ion *isocharge* substitutions of M^{2+} with D^{2+} by itself. Also, the Examiner has failed to reconcile this statement with the fact that Armand '640 teaches, as discussed herein below, a preference for enhancing the electrical and ionic

conductivity of the active material by partially substituting the cation moiety *and* the anion moiety, respectfully.

Applicants respectfully submit that the above-mentioned two teachings must not be viewed in isolation. Rather, the teachings of the Armand '640 patent must be viewed in its entirety, *as a whole*. Applicants submit Armand '640, *as a whole*, does not motivate one to *select* the claimed $LiFe_{1-y}Mg_yPO_4$ species from among the very large genus of compounds defined by the Armand '640 "modified" olivine general formula (I). The Armand '640 patent *fails to provide any particular reason why one should pick and choose* Fe^{2+} for M and Mg^{2+} for D without also making a selection for T, Q and R, and without making any substitution of the PO_4^{3-} polyanion moiety. Armand '640 only states that Mg^{2+} can be substituted into the Fe^{2+} site. Armand '640 does not state that there is *any particular reason or benefit* for doing so. That a reference teaches that something is possible is insufficient, the reference must *motivate* one with ordinary skill in the art to make the selections from among the myriad of possibilities.

It is submitted, the Armand '640 patent actually *teaches away* from the claimed $LiFe_{1-y}Mg_yPO_4$ species. Armand '640 describes modifying a pristine olivine compound by aliovalent or isocharge substitutions to provide "better" or increased ionic diffusivity ("ionic conductivity") *and* electronic conductivity, as compared to electrode materials having a pristine "ordered" olivine structure (e.g. $LiMPO_4$, wherein M is a first-row transition metal or a mixture of first-row transition metals). (See, Col. 2, ll. 50-53; Col. 13, ll. 60-63; and Col. 14, ll. 3-8).

First, the preference in Armand '640 for enhancing ionic conductivity is partial substitution of the *anion* moiety (e.g. Si for P). In particular, Armand '640 states that "disorder on the anionic site provides preferential diffusion sites for Li^+." (Col. 14, ll. 15-16). Armand '640 does not teach that ionic conductivity can be enhanced through partial substitution of the *cation* moiety (e.g. Ti^{2+} for Mn^{2+}).

Second, the preference in Armand '640 for enhancing electronic conductivity is substitution that allows for the coexistence of transitions metals in two difference oxidation states in the same phase. Armand '640 teaches that the presence of Fe^{2+}/Fe^{3+} or Mn^{2+}/Mn^{3+} in the same phase, and/or interaction between elements having redox levels close to those of Fe and Mn (e.g. $Fe^{2+}/Ti^{4+} \leftrightarrow Fe^{3+}/Ti^{3+}$), yields enhanced electronic conductivity. (Col. 14, ll. 8-14). Armand '640 does not teach how one achieves the presence of Fe^{2+}/Fe^{3+} or Mn^{2+}/Mn^{3+} in the

same phase through modification of the olivine structure. However, Armand '640 does teach substitution of M with *transition metals* having redox levels close to those of Fe^{2+} and Mn^{2+}.

Therefore, the preferences taught in Armand '640 to achieve enhanced electronic *and* ionic conductivity over the pristine "ordered" olivine structure, are to partially substitute or modify *both* the cation (M) moiety *and* the anion moiety of the pristine ordered olivine structure. It should also be noted that in the only example provided in Armand '640 for a modified olivine (Example 2), *both* the cation moiety *and* the anion moiety were modified

In contrast, the claimed $LiFe_{1-y}Mg_yPO_4$ species represents an example wherein only the cation (M) moiety of the olivine structure is modified, namely by partially substituting Mg^{2+} for Fe^{2+}. Furthermore, Mg is a *non-transition* metal, which does not undergo oxidation/reduction upon charge/discharge of the $LiFe_{1-y}Mg_yPO_4$ active material. Therefore, not only does the claimed $LiFe_{1-y}Mg_yPO_4$ species lack substitution of the anion moiety, the claimed $LiFe_{1-y}Mg_yPO_4$ species also lacks substitution of the cation (Fe^{2+}) moiety with a *transition metal.*

Therefore, because the Armand '640 patent teaches that both substitutions are preferable in order to achieve better properties over the pristine "ordered" olivine compound, namely enhanced ionic and electronic conductivity, the Armand '640 patent teaches away from the claimed $LiFe_{1-y}Mg_yPO_4$ species.

C **The Claimed Species Exhibits Superior Properties**

The claimed $LiFe_{1-y}Mg_yPO_4$ species is patentable over the teachings of the Armand '640 patent, because the claimed species exhibits superior properties over the only modified olivine compound explicitly described in Armand '640. Armand '640 contains only one explicit teaching of a "*modified*" olivine compound, namely the silico-phosphate compound described in Example 2. Armand '640 does not teach or suggest that any other "*modified*" olivine compound defined by general formula (I), is superior to the silico-phosphate compound of Example 2.

Example 2 of Armand '640 lacks certain information concerning the test cell constructed and the manner in which the cell was cycled (e.g. the surface area of the cathode of Armand's test cell, cycle rate, and the amount of cathode active material present in the cathode). This lack of information prevents Applicants from comparing the reported electrochemical performance of Armand's compound to working examples of Applicants' claimed species (namely,

$LiFe_{0.9}Mg_{0.1}PO_4$ and $LiFe_{0.8}Mg_{0.2}PO_4$) disclosed in the present Application. Therefore, the silico-phosphate compound of Example 2 was synthesized, and test electrochemical cells were constructed and cycled, so that the electrochemical performance results derived there from could be compared to Applicants' reported results for the $LiFe_{0.9}Mg_{0.1}PO_4$ and $LiFe_{0.8}Mg_{0.2}PO_4$ active materials.

Attached hereto as Exhibit 2 is the Declaration of Biying Huang, Ph.D. As the Declaration indicates, the silico-phosphate compound of Example 2 was synthesized, test cells were constructed using the synthesized modified olive, and the cells were cycled. Four lithium metal cells and four lithium-ion or "rocking chair" cells were constructed using the synthesized silico-phosphate compound.

Table 1 below summarizes the first cycle charge and discharge capacities for the eight cells constructed using the silico-phosphate compound synthesized per the teachings of Example 2 of Armand '640. (See also, Exhibit F of Declaration of Biying Huang, Ph.D)

		1st Charge Capacity (mA•hr/gr)	1st Discharge Capacity (mA•hr/gr)
Set A	Lithium metal cell 1	84.53	65.65
	Lithium metal cell 2	61.63	46.80
	Lithium-ion cell 1	70.84	54.99
	Lithium-ion cell 2	66.20	54.99
Set B	Lithium metal cell 1	82.60	63.33
	Lithium metal cell 2	82.38	63.28
	Lithium-ion cell 1	76.74	59.48
	Lithium-ion cell 2	76.22	60.12

Table 1

Table 2 below summarizes the first charge and discharge capacities for the claimed $LiFe_{1-y}Mg_yPO_4$ species, described in pages 43-45 of the present Application. As Table 2 illustrates, Applicants' $LiFe_{0.9}Mg_{0.1}PO_4$ and $LiFe_{0.8}Mg_{0.2}PO_4$ active materials exhibited superior first-cycle charge and discharge capacities, as well as reduced first cycle capacity losses.

	1^{st} Charge Capacity (mA•hr/gr)	1^{st} Discharge Capacity (mA•hr/gr)
$LiFe_{0.9}Mg_{0.1}PO_4$ (lithium metal cell)	150 (154 Theo)	146
$LiFe_{0.8}Mg_{0.2}PO_4$ (lithium metal cell)	135 (136.8 Theo)	122

Table 2

Accordingly, Applicants' claimed $LiFe_{1-y}Mg_yPO_4$ species not only exhibits superior capacity over the material synthesized per Example 2 of Armand '640, but the claimed species also exhibits less first-cycle loss. Therefore, because Applicants' claimed $LiFe_{1-y}Mg_yPO_4$ species exhibits superior properties over the only modified olivine explicitly taught in Armand '640, Applicants submit that the claimed $LiFe_{1-y}Mg_yPO_4$ species is patentable over the teachings of Armand '640.

D. <u>Summary</u>

Applicants submit that the claimed $LiFe_{1-y}Mg_yPO_4$ species is not obvious in view of the teachings of the Armand '640 patent. First, the claimed $LiFe_{1-y}Mg_yPO_4$ species is not *embraced* by the genus defined by the "modified" olivine general formula (I) described in the Armand '640 patent. Application of the four "conditions" of the general formula does not lead to the claimed $LiFe_{1-y}Mg_yPO_4$ species from the "modified" olivine general formula (I).

Second, the teachings of the Armand '640 patent do not *suggest* the claimed $LiFe_{1-y}Mg_yPO_4$ species. The Armand '640 "modified" olivine general formula (I) describes an extremely large genus of compounds. However, the Armand '640 patent provides no express teachings which would motivate one to pick and choose from among from all of the variables of the very large genus of compounds defined by the Armand '640 "modified" olivine general formula (I) to arrive at the claimed $LiFe_{1-y}Mg_yPO_4$ species.

It is further submitted, the Armand '640 patent teaches away from the claimed $LiFe_{1-y}Mg_yPO_4$ species, because Armand '640 teaches that modification of both the anion and

cation moieties is preferable in order to achieve the better properties over the pristine "ordered" olivine compound, namely enhanced ionic and electronic conductivity. Applicants' claimed $LiFe_{1-y}Mg_yPO_4$ species, in contrast, represents a compound wherein only the cation (M) moiety of the olivine structure is modified, namely by partial substitution of Mg^{2+} for Fe^{2+}. The claimed $LiFe_{1-y}Mg_yPO_4$ species lacks substitution of the anion moiety, and also lacks substitution of the cation (Fe^{2+}) moiety with a *transition metal.*

Finally, Applicants' claimed $LiFe_{1-y}Mg_yPO_4$ species exhibits superior capacity and less first-cycle loss than the material described in Example 2 of Armand '640. Accordingly, because Applicants' claimed $LiFe_{1-y}Mg_yPO_4$ species exhibits superior properties over the only modified olivine explicitly taught in Armand '640, Applicants submit that the claimed $LiFe_{1-y}Mg_yPO_4$ species is patentable over the teachings of Armand '640.

Therefore, Applicants respectfully submit that new Claims 179 - 227, are patentably distinct from Armand '640. Accordingly, Applicants respectfully request allowance of these Claims.

6. Conclusion.

In view of the remarks presented herein, Applicants submit that every objection and grounds for rejection stated in the Office Action mailed June 24, 2003, Paper No. 26, have been overcome. Accordingly, Applicants respectfully request allowance of new Claims 179 - 227.

Should anything further be required, the Examiner is respectfully requested to telephone the undersigned at 702-558-1071.

Respectfully submitted,

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